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**Fermilab**

**Beams Division / RFI Department / HLRF Group**

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## **Ferrite Bias Supply SCR Trigger Card Test Procedure**

Greg Giese originally wrote this procedure in May of 1987. This procedure and his test fixture he personally built has been used to test and repair the Booster / Main Injectors Ferrite Bias Supplies Trigger Cards within the Beams Divisions High Level RF Group since. The reason for the reproduction of this document is so that it could be in electronic form.

**Schematics required:** MARK II- DWG# ED-62908

**OPT.** MARK II Wiring Diagram DWG# ED-62816

LING, NAL- DWG# ED-62306

## TEST FIXTURE

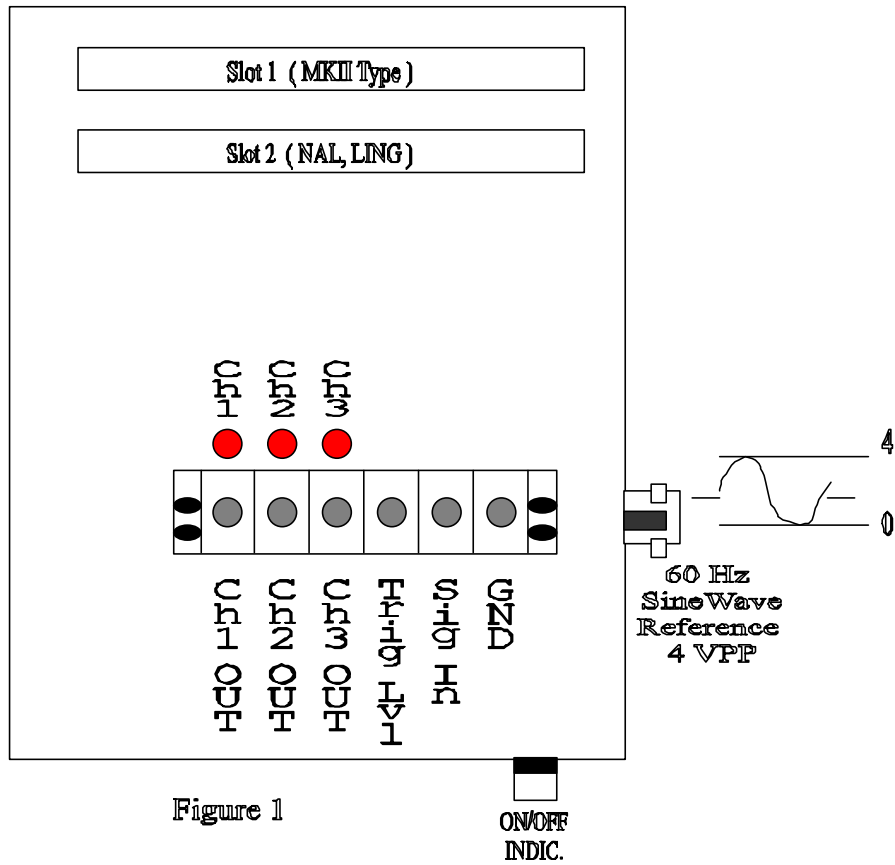


Figure 1

## SCR Trigger Cards

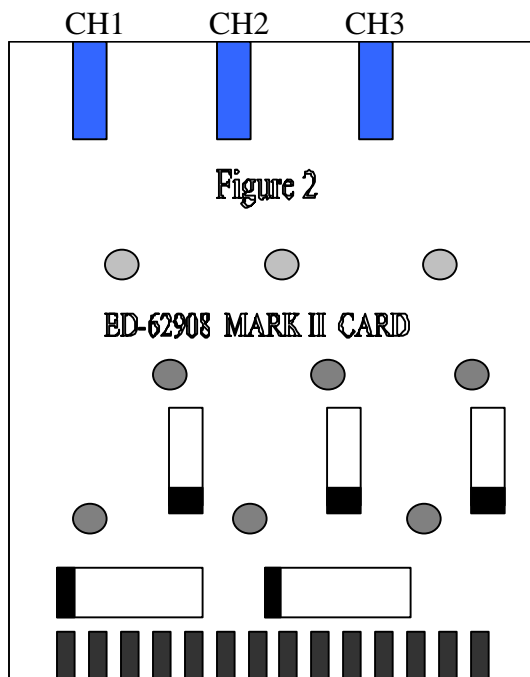


Figure 2

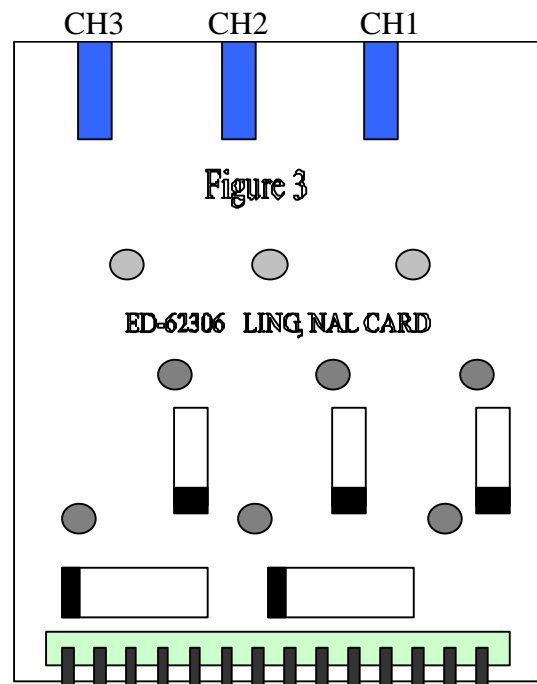


Figure 3

### Trigger Card Block Diagram (Typical 3 Channels)

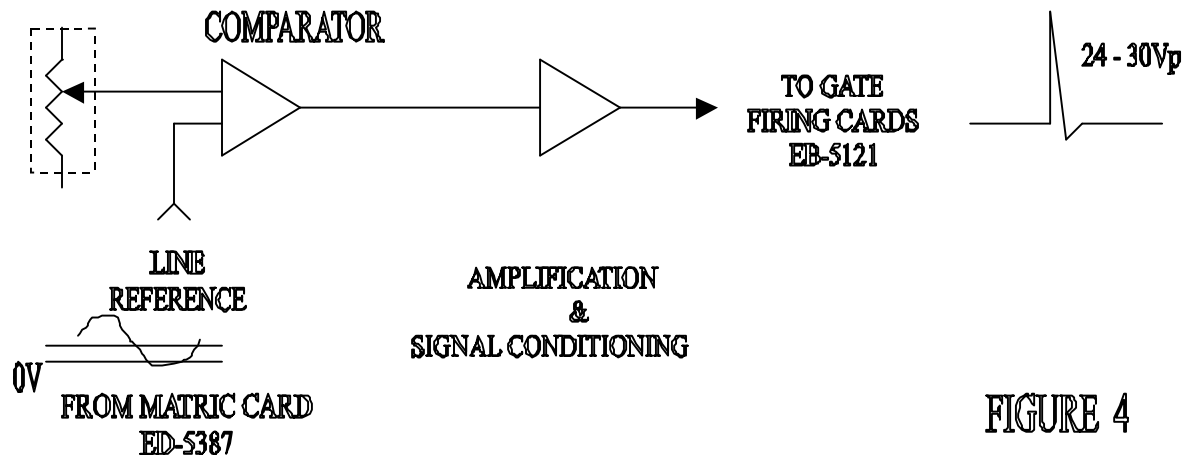


FIGURE 4

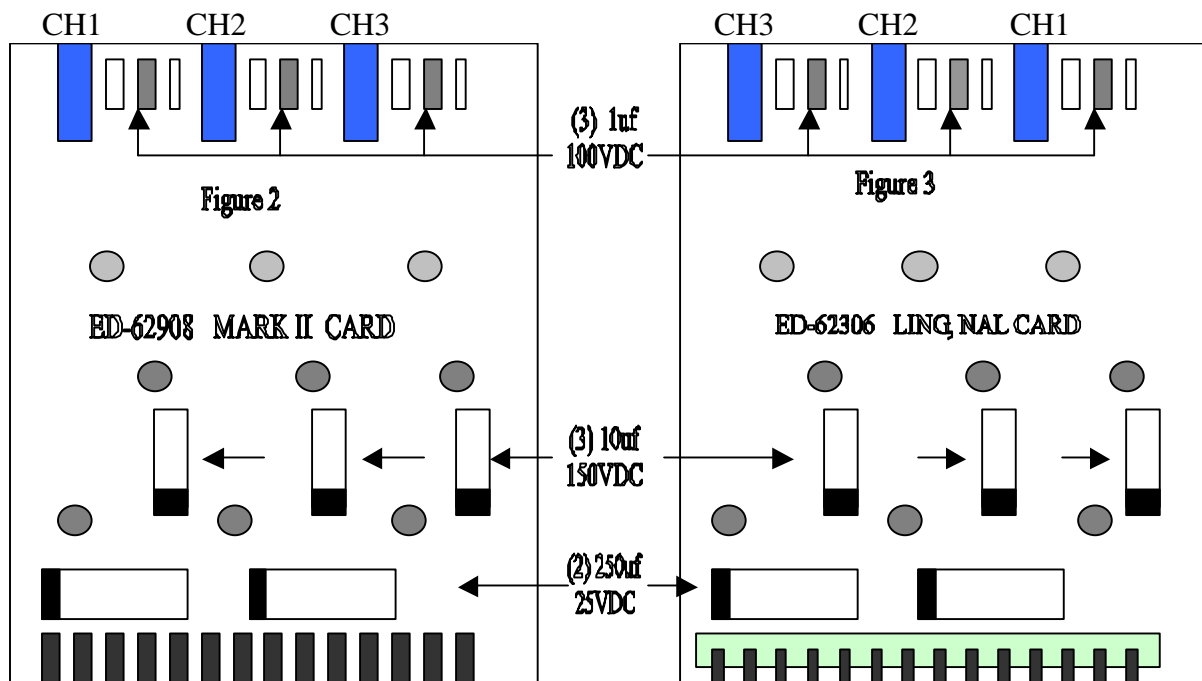
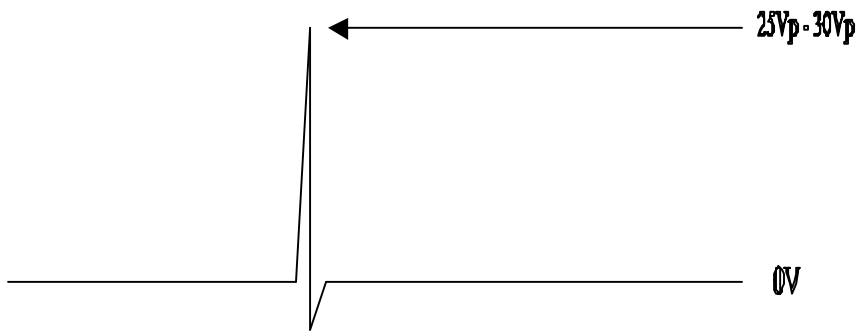
### TRIGGER CARD

The Trigger card provides a pulse to the Gate Firing Cards, which in turn apply a pulse to the MAIN Rectifying SCR's. The Trigger cards derive this pulse by comparing a sine wave and phase signal from the feedback card. The level from the feedback varies as to the amount of current needed by the Bias Supply. The feedback card processes the  $I_o$ ,  $V_o$ ,  $I_Q$ , and sends the proper drive level to the trigger card. The Sine Wave to each channel of the 4 feedback cards vary by 30 degrees per channel this is performed via the phase X former and the Matrix cards to the trigger cards. This allows the proper turn on of the respective SCR's in a 12 phase rectifying circuit.

### TEST FIXTURE OPERATION

The test fixture allows troubleshooting and verification of correct operation of the trigger card w/o running in a Bias Supply. One only needs to supply a 4Vpp Sine Wave to the sine wave reference connector on the right hand side of the box. See figure 1. The test fixture supplies the same sine wave to all channels unlike actual operation in the Bias Supply. This also allows one to synchronize all three channels of a card with the potentiometers provided a separate sync exists from your sine wave source and the scope used to view the output pulses. They actually provide little improvement in operation. The drive level from the feedback card is simulated inside the box and is not adjustable from the outside. It may be monitored how ever. It is common to all three channels. The output pulses are monitored at the designated points and the LED designates "some sort of output". The channels are designated differently on the two different types of cards. (See figures 2 & 3) But are correctly designated at the test points, for both cards. The outputs of the channels are ran into a load that is the same load a gate firing card presents in the real world.

The output pulses vary from 25Vp to 30Vp.

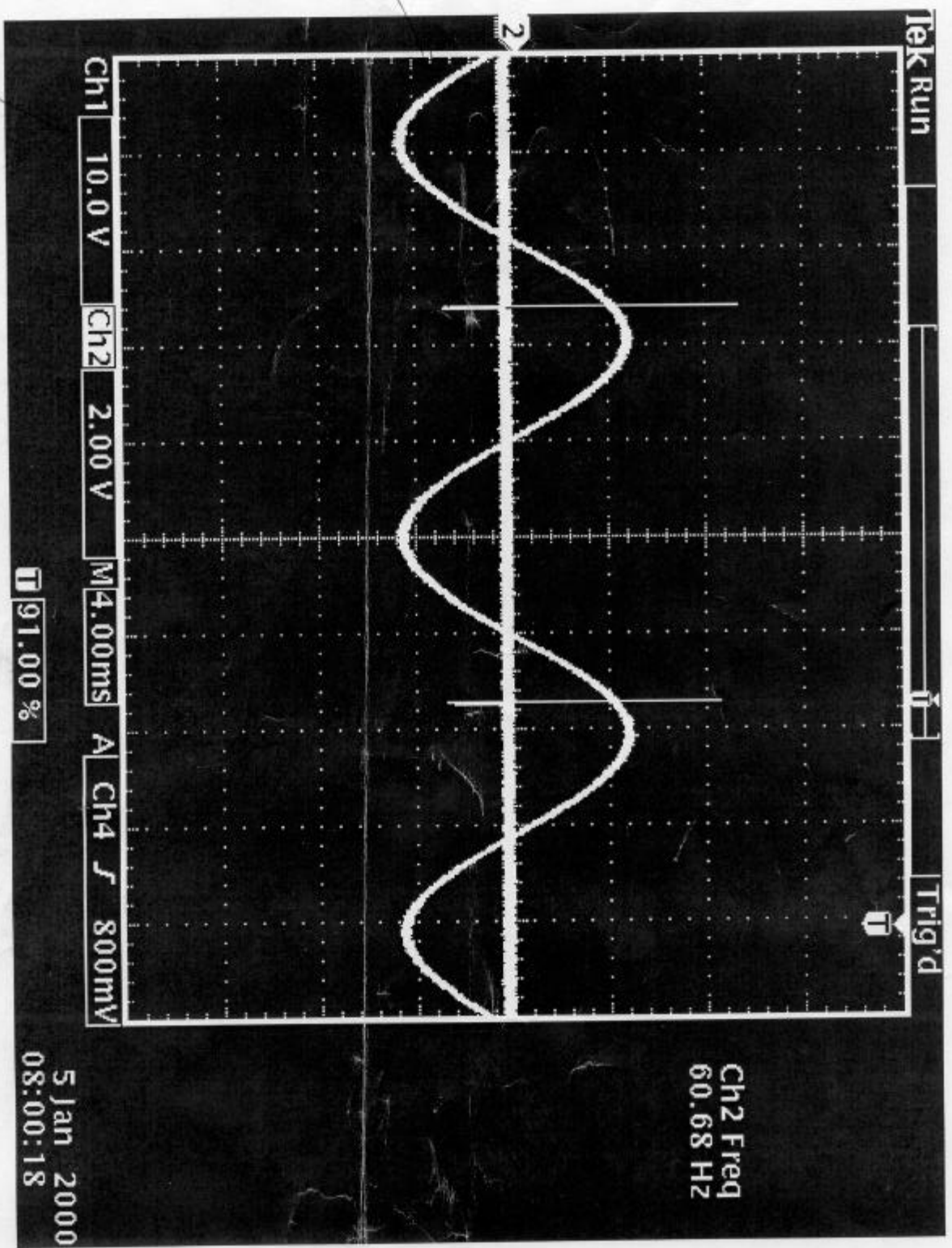


- 1) Replace existing electrolytic W/ 1uF Ceramic (Stock).  
This must be done! Greg Giese has completed 98% of them by 5/11/87
- 2) As cards show up for repair these should be replaced with caps Sprague Atom TVA-1406 10uF 150V.
- 3) Same as above Sprague TVA-1208 250uF 25V

#### UPDATE 5/22/02

- 4) Found as of 5/19/02 that the now stocked Special Process Spares Motorola type LM301AH operational amplifiers now needs external compensation. With the earlier MC301AH/LM301AH operational amplifiers this was not necessary. The boards have provisions for the 10-30pF compensating capacitor.

60Hz  
Sync  
VS  
OUTPUT  
PULSE



X1  
FBS-SCR TRIG CARD  
(ON TEST FIXTURE)